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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT Application of
VINCENT, Denis
Application N°: 10/054,571
Filed: November 12, 2001

Group Art Unit: 1742
Examiner: Harry D. Wilkins III

For: NICKEL-FREE GREY GOLD ALLOY

* * * * *

DECLARATION UNDER 37 C.F.R. (1.132)

RECEIVED

Hon. Commissioner of Patents
And Trademarks
Washington, D.C. 2023

MAR 11 2004

Dear Sir,

I, Denis VINCENT, declare and say as follows:

1. I am a French citizen presently residing at Poudrières 29 CH-2000 Neuchâtel (Switzerland)

2. I have been working in the field of precious metals, dental, jewelry and horology for more than 19 years, and I am the inventor of present US Patent Application No. 10/054,571.

3. I am Head of Research & Development of Watch Division at METALOR TECHNOLOGIES SA Avenue du Vignoble, CH—2009 Neuchâtel— Switzerland.

I am President of ISO (International Organization for standardization) Technical Committee 114 Horology SC6 Precious metal coverings.

I am Doctor of philosophy of Lyon University (Physical Science) 1982.

4. Three samples JP1, JP2 and US corresponding to three alloy compositions set out in the following table have been produced by casting an ingot, then cold worked by rolling before being cast by lost wax process using a Manfredi rotary machine.

Sample No.	Au	Pd	Cu	In	Ga	Re	Ti	Ir	Total
JP1	75.0	12.5	12.5	-	-	-	-	-	100.0
JP2	75.0	15.0	10.0	-	-	-	-	-	100.0
US	75.1	13.0	10.039	1.5	0.35	0.001	0.01	0.006	100.0

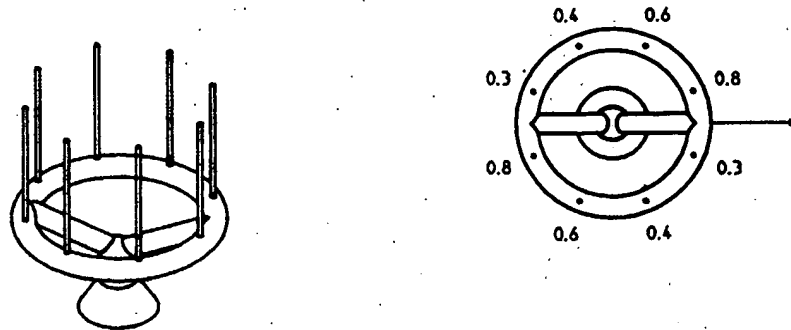
Sample US corresponds to an alloy composition according to the invention, namely very close to that of Example 12 in Table 12 of present US Patent Application Serial No. 10/054,571, whereas samples JP1 and JP2 correspond to alloy compositions specifically described in Fujimoto (JP-09-078160) in Examples 1 and 2, respectively.

5. Castability examination

The lost wax casting test.

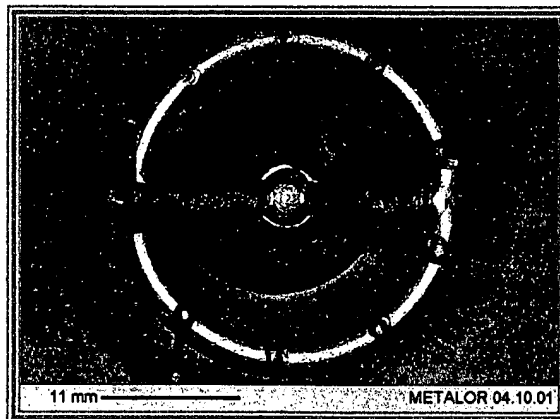
The wax pattern is made as follows.

From the conical injection sprue, two "V" shaped channels fill up a spruing wheel. On this wheel 8 wires each 20 mm long are symmetrically positioned by dimension. They have a diameter of 0.8, 0.6, 0.4 and 0.3 mm, respectively. The length measured after casting allows assessing the castability of the alloy.

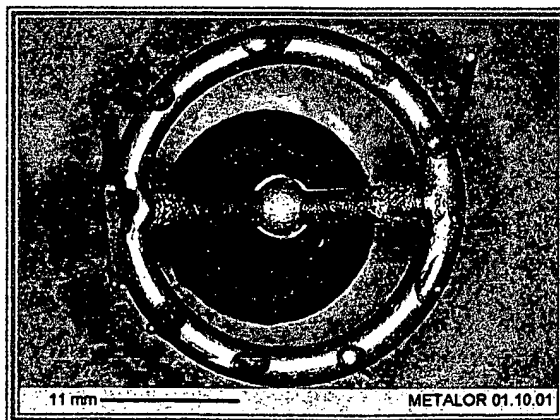


Photographs of the casting trees obtained for samples JP1, JP2 and US are displayed below

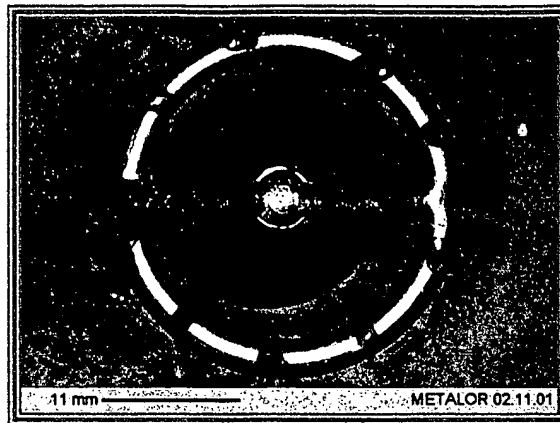
JP1



JP2



US



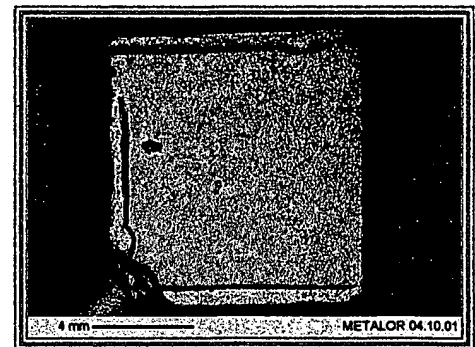
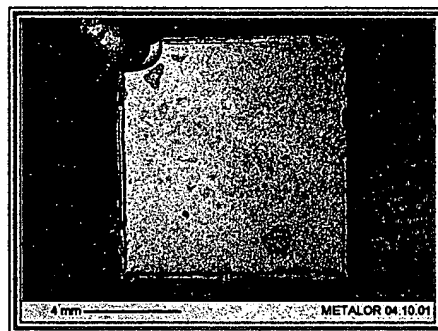
The casting trees combined with measurement of the fusion intervals (JP1: 1060-1100 °C; JP2: 1100-1160 °C; US: 1035-1115 °C) show that for similar liquidus (completely melt alloys) the casting behavior gives the fine aesthetic result that is requested for jewelry applications only for sample US according to the invention and not for comparative samples JP1 or JP2.

6. Metallographic surface observation.

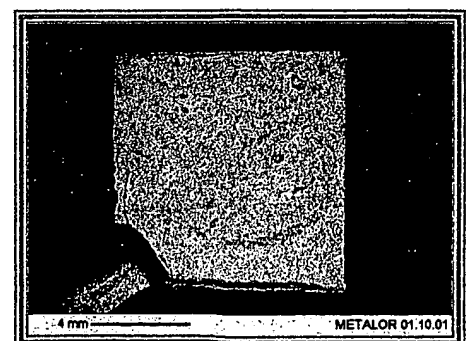
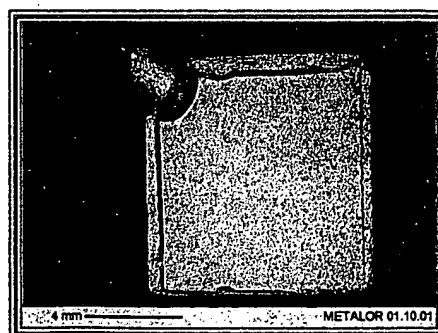
A square of 10 X 10 X 1 mm is used as a sample for metallography.

The following photographs of three samples JP1, JP2 and US depict both sides of each sample side by side.

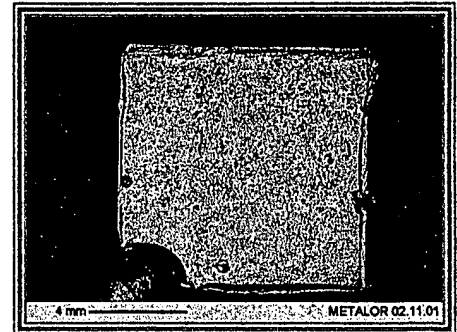
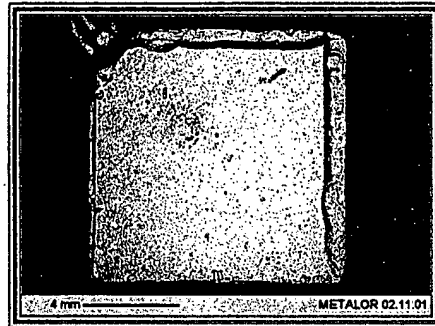
JP1



JP2



US



The above photographs show that the surface of sample US according to the invention is of much better quality (less defects per cm^2) than that of comparative samples JP1 and JP2.

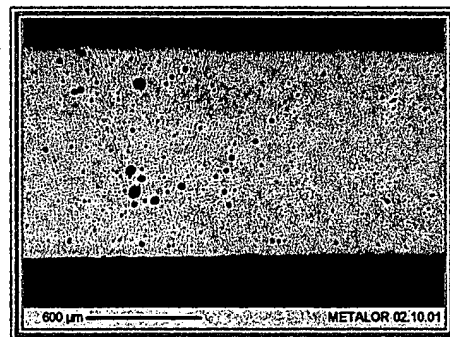
7. Metallographic cut observation by microscopy.

A cut of a square of 10 X 10 X 1 mm will be used as a sample for each of JP1, JP2 and US.

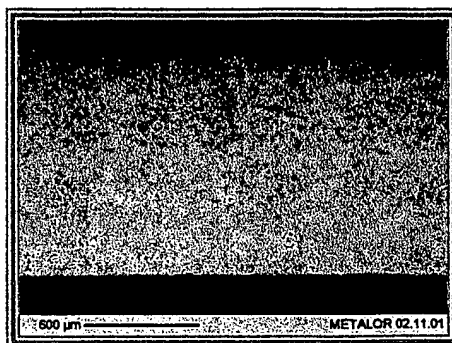
JP1



JP2



US



The above micrographs show that the internal structure of sample US according to the invention is of much better quality than that of comparative samples JP1 and JP2.

8. Color analysis

International norm ISO 8654 specifies the gold alloy colors from yellow-green, 0N, to red, 5N. It does not specify the color of grey gold alloys.

The standard colors of 18 carats alloys are

- 2N light yellow,
- 3N yellow,
- 4N pink and
- 5N red, respectively.

An 18 carats alloy is here considered as gray if it is closer to the rhodium color than to the standard colors of 18 carats alloys. Rhodium is plated on jewelry made from a grey gold alloy. It beautifies component L, to enhance the shine of precious stones. Alloys the color of which is more than 6 scores from the color of rhodium are rhodic ($\Delta E / Rh$).

See Appendix 1 B for more details.

The color analysis results are gathered in Appendix 1A and 1B in which the term "composition 12" refers to sample US according to the invention.

The graphs according to Lab co-ordinates show and the Tables show that comparative samples JP1 and JP2 are nearer the color of a Pt 95 % by weight sample than sample US according to the invention. The color of sample US is close to that of Rhodium, which is the reference color for jewelry.

9. The above castability, metallographic and color analysis results show that the alloy US according to the invention shows unexpected improvements compared to the alloys JP1 and JP2 of Fujimoto for applications in jewelry.

9. I hereby declare that all statements made herein of my knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. (1001) and that such willful false statements may jeopardize the validity of the present application or any patent issued thereon.

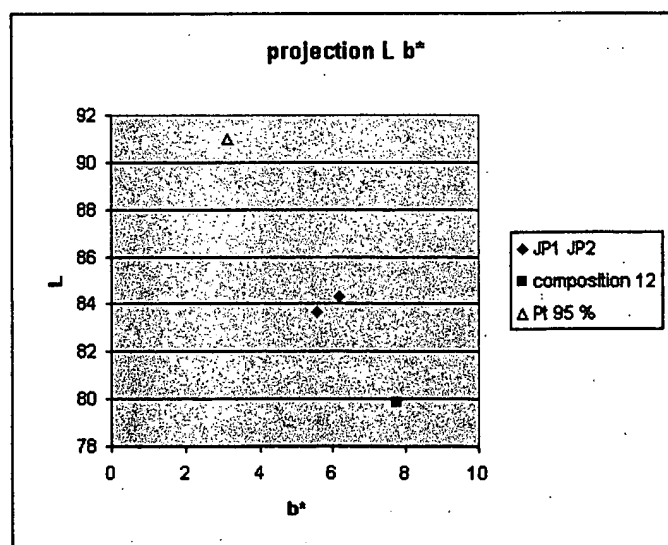
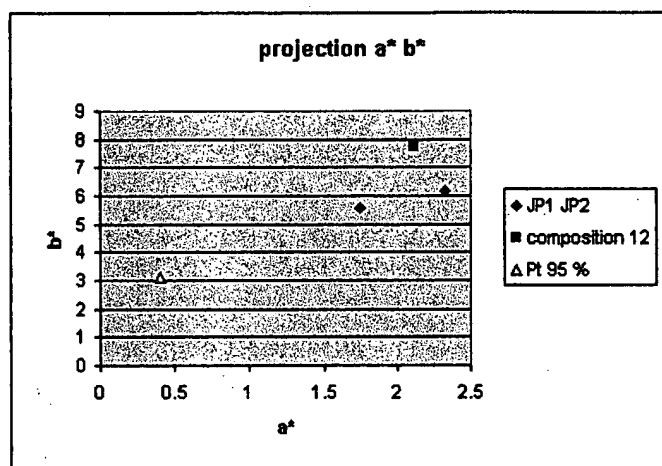
Dated February 23, 2004

Denis VINCENT

A handwritten signature in black ink, consisting of a stylized 'D' followed by a series of loops and a long horizontal stroke extending to the right.

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Appendix 1A

	Color			Difference of color DE with platinum alloy
	L	a*	b*	
JP1	84.29	2.33	6.18	7.6
JP2	83.7	1.75	5.58	7.8
composition 12	79.87	2.12	7.75	12.1
Pt 95 %	91	0.4	3.13	0.0



Appendix 1B

It is possible to measure the colors with optical spectrophotometer. The International Comity on Illumination CIE 1976 describes color with three numbers:

- L^* , a^* and b^* . So called opponent color coordinates.

Three axes permit to show in spatial representation any color:

1. L^* , vertical axis: black, $L^* = 0$; white, $L^* = 100$.
2. Positive a^* = red ; Negative a^* = green.
3. Positive b^* = yellow; Negative b^* = blue.

Two colors in this system could be compared with the following formula:

$$DE = ((a^*_2 - a^*_1)^2 + (b^*_2 - b^*_1)^2 + (L^*_2 - L^*_1)^2)^{1/2}$$

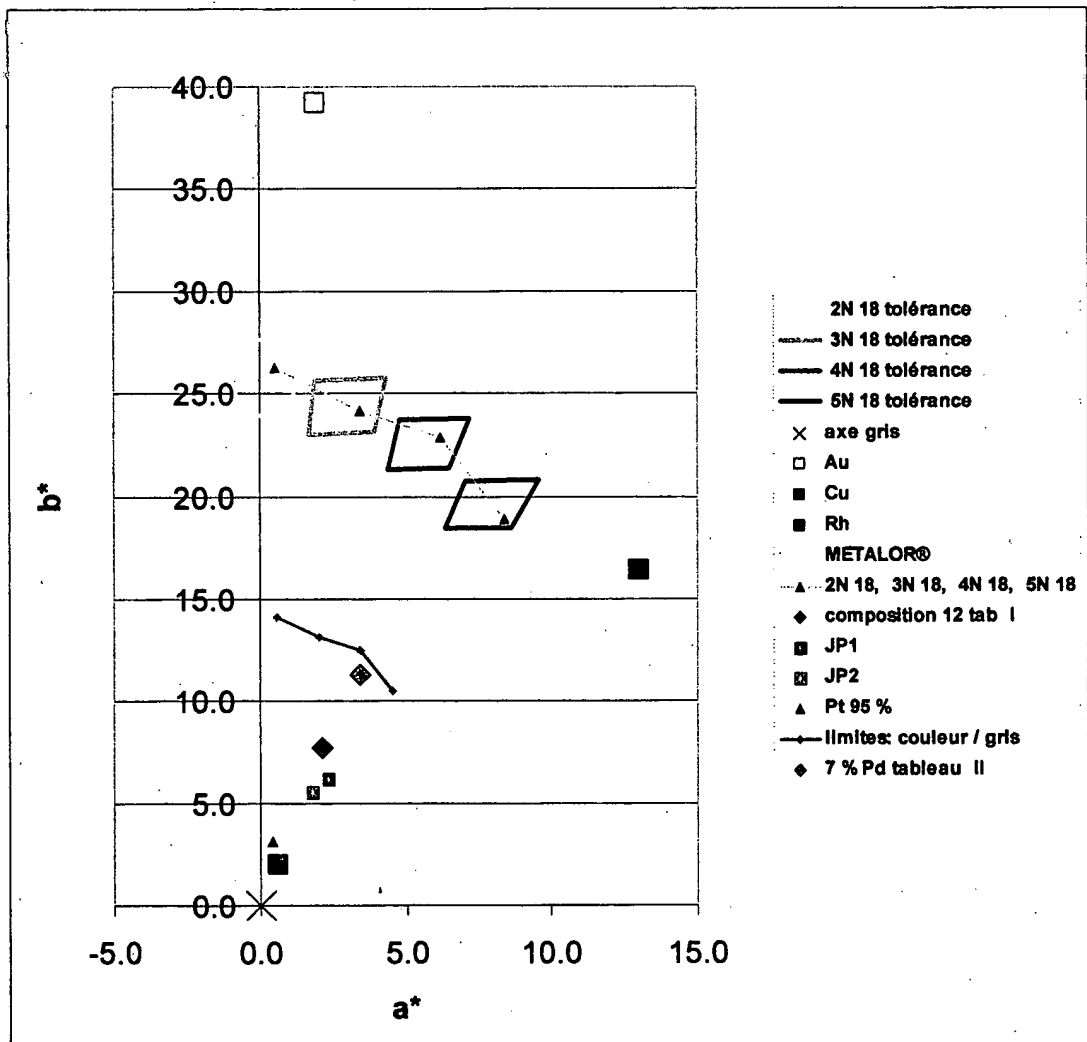
If $DE < 1$ not visible for a human eye.

The color of colored gold alloys is normalized; ISO 8654.

Six colors are normalized

- For 14-Ct, the colors are: 0N green, 1N pale yellow.
- For 18-Ct, the colors are: 2N pale yellow, 3N yellow, 4N pink, and 5N red.

No normalization exists about white or grey alloy. We consider as grey an alloy which have a color nearer the rhodium color than the normalized 18 carats colored alloys



Appendix 1B (continued)

L	désignation	tri	b*	Delta E/ Rh
91.20	Au	1.90	39.20	37.27
90.90	2N 18,	0.50	26.30	24.39
89.90	3N 18,	3.40	24.20	22.59
88.80	4N 18,	6.20	22.90	22.04
86.90	5N 18	8.40	18.90	19.59
88.20	Cu	13.00	16.40	19.60
91.95	limites: couleur / grs	0.55	14.15	12.20
91.45	limites: couleur / grs	2.00	13.10	11.29
90.90	limites: couleur / grs	3.40	12.45	11.02
79.52	7 % Pd tableau II	3.40	11.30	16.61
89.95	limites: couleur / grs	4.50	10.45	9.79
79.87	composition 12 tab I	2.12	7.75	14.41
84.29	JP1	2.33	6.18	9.81
83.70	JP2	1.75	5.58	10.03
91.00	Pt 95 %	0.40	3.13	2.31
93.00	Rh	0.60	2.00	0.00

tri	L	désignation	b*
	93.00	Rh	0.60
	91.95	limites: couleur / grs	0.55
	91.45	limites: couleur / grs	2.00
	91.20	Au	1.90
	91.00	Pt 95 %	0.40
	90.90	2N 18,	0.50
	90.90	limites: couleur / grs	3.40
	89.95	limites: couleur / grs	4.50
	89.90	3N 18,	3.40
	88.80	4N 18,	6.20
	88.20	Cu	13.00
	86.90	5N 18	8.40
	84.29	JP1	2.33
	83.70	JP2	1.75
	79.87	composition 12 tab I	2.12
	79.52	7 % Pd tableau II	3.40

L	désignation	tri	b*
88.20	Cu	13.00	16.40
86.90	5N 18	8.40	18.90
88.80	4N 18,	6.20	22.90
89.95	limites: couleur / grs	4.50	10.45
90.90	limites: couleur / grs	3.40	12.45
89.90	3N 18,	3.40	24.20
79.52	7 % Pd tableau II	3.40	11.30
84.29	JP1	2.33	6.18
79.87	composition 12 tab I	2.12	7.75
91.45	limites: couleur / grs	2.00	13.10
91.20	Au	1.90	39.20
83.70	JP2	1.75	5.58
93.00	Rh	0.60	2.00
91.95	limites: couleur / grs	0.55	14.15
90.90	2N 18,	0.50	26.30
91.00	Pt 95 %	0.40	3.13